REMARKS

Claims 41, 42, 44-48 and 50-59 are pending in the application. Favorable reconsideration of the application, as amended, is respectfully requested.

I. CLAIM AMENDMENTS

Claims 41, 48, 55, and 57 have been amended herein. Amendments to claims 41, 55, and 57 are discussed below. Claim 48 has been amended only to correct a minor typographical error and has not been substantively altered. Accordingly, Applicant respectfully requests favorable consideration of the amended claims.

II. REJECTION OF CLAIMS 41-42, 44-48, and 50-59 UNDER 35 USC §112

Claims 41-42, 44-48, and 50-59 stand rejected under 35 U.S.C. §112, first paragraph, for failing to comply with the written description requirement. In one instance, the Examiner states that the language "or contains a cuprate," as recited in claim 55, is not disclosed in the specification. Claim 55 has been amended to read "wherein at least one layer of the superconducting compound is a cuprate."

Moreover, the Examiner contends that the specification as filed does not disclose "$a = L_{par}/L_{per}$ exceeding 1.5," as recited in claims 41 and 42. The specification has been amended by adding new paragraphs after the paragraph beginning at page 9, line 23, which starts with "Another advantage of the invention...." Support for the new paragraphs may be found in the Article 19 amendments that were filed on the same day as the PCT application from which the present U.S. national stage application extends, as well as in the specification.

As stated in 35 U.S.C. 363, "an international application designating the United States shall have the effect, from its international filing date under article 11 of the treaty, of a national application for patent regularly filed in the Patent and Trademark Office." Moreover, according to 37 C.F.R. § 1.115(a)(1), "a preliminary amendment that

is present on the filing date of an application is part of the original disclosure of the application." Since the Article 19 amendments were filed on the same day as the PCT application and therefore, are part of the original disclosure, the specification may be amended to include the subject matter claimed in the Article 19 amendments (MPEP 2163.06). For the Examiner's convenience, Applicant has enclosed a chart showing where support for each of the new paragraphs may be found in the original disclosure.

Accordingly, applicant respectfully submits that the specification, as amended, properly discloses the claimed subject matter.

Claims 41, 52, and 57 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In particular, the Examiner indicates that the term "close to its surface" in claim 41 is a relative term which renders the claim indefinite. Claim 41 has been amended to recite "at least on the surface". Accordingly, applicant respectfully submits that claim 41, as amended, clearly and definitely describes the claimed subject matter.

Furthermore, the Examiner indicates there is insufficient antecedent basis for the limitation "the grains" in Line 1 of both claims 52 and 57.

Claim 52 does not recite the limitation "the grains." In fact, no claim other than claim 57 recites "the grains" in Line 1, as stated by the Examiner. Accordingly, applicant respectfully requests withdrawal of this rejection.

Claim 57 has been amended to recite "the grains of the substrate and/or the superconducting grains". This wording appears in claim 41, from which claim 57 depends. Accordingly, applicant respectfully submits that claim 57, as amended, clearly and definitely describes the claimed subject matter.

For the above reasons, applicant respectfully requests withdrawal of the rejections under 35 U.S.C. §112.

III. REJECTION OF CLAIMS 41, 42, 44, 46-48, 50-56, 58, and 59 UNDER 35 USC §103(a)

Claims 41, 42, 44, 46-48, 50-53, and 59 stand rejected under 35 USC §103(a) based on Truchan et al. in view of Matsumoto et al. Claims 54-56 stand rejected under 35 USC §103(a) based on Truchan et al. in view of Matsumoto et al and Jia et al. Claim 58 stands rejected under 35 USC §103(a) based on Truchan et al. in view of Matsumoto et al. and Tieme et al. Applicant respectfully requests withdrawal of the rejection for at least the following reasons.

The claimed invention sets forth a method for improving the performance of a superconductor. To achieve this, a novel approach to fabricating such a superconductor is disclosed. As amended, claim 41 recites a method for making a long superconductor, e.g., a tape or wire, by depositing at least one polycrystalline superconducting compound onto a metallic substrate or onto a buffer layer system on said substrate, that includes, *inter alia*, the steps of:

> (1) fabricating said metallic substrate or said buffer layer system on said substrate to consist of or to contain at least on its surface a microstructure of longitudinally oriented, ***long grains with a high aspect ratio***; and
>
> (2) epitaxially growing a superconducting compound on said substrate or said buffer layer system so as to produce longitudinally oriented ***long grains*** with a high aspect ratio, $a = L_{par}/L_{per}$ exceeding 1.5, in the superconducting compound.

Unlike prior art methods, the claimed invention provides special treatment to the base substrate. For example, by appropriately treating the usually metallic substrate, long grains, i.e. grains with a minimum aspect ratio greater than that described in the prior art, are fabricated in said substrate.

According to the claimed invention, growing a superconductor thereon (in the usual manner, with or without intermediate layers), results in a superconductor also

having long grains, specifically grains that, in the direction of current flow, are longer than they are wide. Such long grains provide the improved percolation path in a superconductor which leads to a better performance than before. One may say that the long grains of the substrate induce long grains in the superconductor, or that the long grains in the superconductor "replicate" the long grains in the substrate.

Neither Truchan et al. nor Matsumoto et al. disclose the claimed structure of the grains in the substrate. Instead, Truchan et al. discloses that the grains in said substrate can, to a large extent, be aligned. This alignment or preferred orientation is often called "textured," as described in both Truchan et al. and Matsumoto et al. Applicants note that the grains of the materials used for the intended purpose, e.g., Ni or Ni alloys, as claimed, usually have an irregular shape (e.g., a potato-like shape).

Contrary to the Examiner's view, there is no relationship between the texture (or surface smoothness) of a substrate and the length of the grains of that material. In other words, if a material is well-textured, this simply indicates that its grains are well aligned. It does not indicate that its grains are long, let alone that they have a certain Lpar/Lper ratio. This is true for both the above-mentioned Truchan et al. reference and the Matsumoto et al. reference (as explained in the last response, dated 29 October 2007).

The Examiner states on page 5, second paragraph, that the cited prior art is silent about the shape, the structure and the Lpar/Lper ratio of the superconductor grains. This is correct.

Also, the cited prior art is silent about the length of the grains of the substrate. There is no indication that they should be long grains with a minimum aspect ratio, Lpar/Lper, as defined by the claimed invention.

Further, the cited prior art is silent about the novel understanding that the length of the grains in the substrate affects the length of the grains in the superconductor.

There is one additional aspect showing that the prior art takes an approach significantly different from the claimed invention. Truchan et al. concentrates on refining the orientation of the grains, desiring to achieve a small percentage of misorientation: "misorientation angles greater than about 8° limited to less than 1%." Contrary to that, the claimed invention focuses on the elongation of the grains, allowing a rather large misorientation, namely requiring just 10% of the total volume V of elongated grains in the superconductor.

For at least the reasons expressed above, the proposed combination of Truchan et al. and Matsumoto et al. fail to teach or suggest the features of the claimed invention.

The rejections of dependent claims 54-56 and 58 are based on Truchan et al. in view of Matsumoto et al. and in further view of either Jia et al. or Tieme et al. For at least the same reasons as above, the proposed combination of references also fails to teach or suggest the features of the dependent claims.

Accordingly, applicant respectfully requests withdrawal of the rejections.

Further Explanation Based on Enclosed Documents

To shine some light onto the situation from another viewpoint, two publications are enclosed: both are scientific papers from the well-respected journal "Applied Physics Letters" of the American Institute of Physics.

The first paper (Paper A) by Feldmann et al. dates from 30 October 2000, i.e. before the filing date of the present patent application.

The second paper (Paper B) by Eickemeyer et al. dates from 5 January 2007, i.e. after the filing date of the present patent application. The authors clearly have knowledge of the present invention; the inventor of the present patent application, Jochen Mannhart, is mentioned in the last paragraph of the paper.

The "prior art" Paper A discusses the effect of using textured substrates for a superconductor. Fig. 2 of this paper shows the form of the grain boundaries (GB) – and

thus the form of the grains in a substrate and in a superconductor on the substrate. The grains have a slightly oval, somewhat angled form. This is the kind of grains discussed in the cited prior art, i.e. the Truchan and the Matsumoto references mentioned above. Their aspect ratio Lpar/Lper is close to 1.

Paper B discusses the effect of an elongated grain structure in the substrate on the superconductor. Fig. 2(a) shows the grains of a substrate: they are much longer than the grains shown in Paper A; their aspect ratio Lpar/Lper is said to reach about 4. Paper B also discusses the positive effect of these elongated grains on the superconductors performance and shows in Fig. 1 a (schematic) sketch of such elongated superconductor grains.

Thus, applicant respectfully requests favorable consideration of the claims in view of the remarks above.

IV. CONCLUSION

Accordingly, all claims 41, 42, 44-48 and 50-59 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should a petition for an extension of time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988.

Respectfully submitted,

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Amendments to the Specification:	**Support in the Original Disclosure:**
To summarize, the invention concerns a method for making a long superconductor, e.g., a superconducting tape or wire, and a so produced superconductor. This long superconductor comprises at least one polycrystalline superconducting compound deposited on a substrate, preferably on a buffer layer system on said substrate, wherein at least one percolation path extends along the length of the tape or wire. This path consists of grains of the superconducting compound, whereby the majority of these grains in the path have a shape such that their projection onto the surface of the substrate, being characterized by a length L_{par} parallel to the longitudinal extension of the tape and a length L_{per} perpendicular thereto, has an aspect ratio $a = L_{par}/L_{per}$ exceeding 1.5 or even 2. Further, the total volume V of grains that are members of such one or more percolation paths exceeds 10% of the volume of the superconducting compound.	See, e.g., claims 1 and 17 in the Article 19 amendments.
One of the further aspects of the invention is that at least 95% of the grains have the shape with the predetermined aspect ratio $a = L_{par}/L_{per}$.	See, e.g., claim 2 in the Article 19 amendments.

Another aspect is that the aspect ratio $a = L_{par}/L_{per}$ of the grains in the superconductor is determined by the microstructure of the substrate, in particular by the structure of its surface, e.g., by the shape and aspect ratio of the grains forming the surface of the substrate.	See, e.g., specification at page 12, line 28 to page 13, line 1; and claims 1 and 3 in the Article 19 amendments.
A further aspect is that the aspect ratio of the grains in the superconductor is determined by the microstructure of the buffer layer system, in particular by the aspect ratio of its grains at the interface to the superconductor.	See, e.g., specification at page 12, line 28 to page 13, line 1; and claims 4 and 5 in the Article 19 amendments.
The microstructure of the substrate or the buffer layer system, respectively, may be formed by mechanical treatment for producing small grooves in its surface, e.g., by polishing the substrate's surface. It may also be controlled by atom-beam treatment. These microstructure control steps may be executed and/or repeated until an average angular misorientation of the grains of less than 15° is achieved.	See, e.g., specification at page 8, lines 19-29; page 12, lines 9-14; and claims 18-21 in the Article 19 amendments.
Still further aspects are that the aspect ratio of the grains of the superconductor $a = L_{par}/L_{per}$ exceeds 4 and/or that the volume V of grains that are members of one or more percolation paths exceeds 25% of the volume of the superconducting compound.	See, e.g., claims 7 and 8 in the Article 19 amendments.

Still further aspects are that the buffer layer system consists of a single layer only, or that the superconducting compound is a polycrystalline compound directly deposited on the substrate without intermediate buffer layer.	See, e.g., claims 6 and 10 in the Article 19 amendments.
Still further aspects are that the superconducting compound is a cuprate or belongs to the $ReBa_2Cu_3O_{7-\delta}$ family, Re being a rare earth including La or Y.	See, e.g., specification at page 13, lines 3-7; and claims 11 and 12 in the Article 19 amendments.
Another aspect is that the superconducting compound is a multilayer arrangement whose layers have different compositions.	See, e.g., specification at page 13, lines 3-12; and claim 9 in the Article 19 amendments.
Still further aspects are that the grains in the superconductor are aligned such that the average misorientation angle, in particular of the a-axis of the grains, is less than 20°.	See, e.g., specification at page 12, lines 13-14; and claims 13 and 14 in the Article 19 amendments.
Still further aspects are that the deposition of the superconductor is performed from the vapor phase or from a solution.	See, e.g., specification at page 13, lines 12-16; and claims 22 and 23 in the Article 19 amendments.

A still further aspect is that the substrate is a metallic tape such as steel or Ni alloy with a thickness in the range of 20 to 100 μm, whose surface grains are appropriately aligned.	See, e.g., specification at page 11, line 27 to page 12, line 7; and claim 15 in the Article 19 amendments.
Still further aspects are that the buffer layer comprises a plurality of sublayers such as $CeO_2/YsZ/CeO_2$ and/or the superconductor is of the $ReBa_2Cu_3O_{7-\delta}$ family, Re being a rare earth, including La or Y.	See, e.g., specification at page 12, lines 14-18; page 13, lines 3-7; and claim 16 in the Article 19 amendments.